San Francisco Bay Conservation and Development Commission
455 Golden Gate Avenue, Suite 10600, San Francisco, California 94102 tel 415 352 3600 fax 415 352 3606

July 11, 2019

TO: Engineering Criteria Review Board (ECRB) Members

FROM: Lawrence J. Goldzband, Executive Director (415/352-3653; larry.goldzband@bcdc.ca.gov)
Rafael Montes, Senior Staff Engineer (415/352-3670; rafael.montes@bcdc.ca.gov)
Walt Deppe, Coastal Program Analyst (415/352-36; walt.deppe@bcdc.ca.gov)

SUBJECT: **Alameda Marina Project, City of Alameda, Alameda County**
(For Board consideration on July 25, 2019)

Project Summary

Project Name. Alameda Marina Project, City of Alameda.

Project Proponent. Sean Murphy of Pacific Shops, Inc. (PSI.)

Site and Project Description. The Alameda Marina project.

Project Geotechnical Engineer. Rockridge Geotechnical, Inc.

Project Marine Structural Engineer. Simpson Gumpertz & Heger (SGH) Inc.

Project Civil Engineer. Angelo Obertello (Carlson, Barbee & Gibson or CBG.)

Project Description

Project Site. The approximately 44-acre project site is located at 1815 Clement Avenue, on the north waterfront of the City of Alameda, Alameda County. The project site is bounded by the Oakland Estuary to the north, the U.S. Navy Operational Support Center to the east, Clement Avenue to the south, and a City-owned parcel to the west, which includes the Alameda Municipal Power Department and the Grand Street public boat launch facility along the Bay.

The project site consists of public tidelands and privately-owned land (including submerged land). Approximately 27 acres of the project site is owned in fee by PSI. This includes most of the upland portion of the site, as well as a portion of the marina and graving dock structure, both of which are located in the Bay. The remainder of the project site, including the majority of the site within the Bay and along the shoreline, is owned by the City and leased to PSI.

Existing Conditions The site was first developed in 1914 as a shipyard, and later expanded, most significantly in the 1940s, to support wartime shipbuilding. A remnant graving dock remains at the site from this approximate period, as do roughly 37 buildings that were constructed for the shipyard expansion. Starting in the 1960s, much of the shipbuilding infrastructure was removed, and the site was used primarily for boat repair and maintenance, upland storage, light industry, and a boat marina.

The marina covers approximately 17 acres of the project site, including 11 piers and approximately 530 boat slips. The land portion of the site contains approximately 250,000 square feet of maritime, commercial and retail, warehouse and storage uses, including dry storage for boats and recreational vehicles, such as sail and motor boats. Approximately 83 percent of the land portion of the site is paved in asphalt or concrete and used mostly for circulation or outside storage for boats and recreational vehicles. There are approximately 37 buildings on the site, which cover about 16 percent of the total land area.

Much of the shoreline infrastructure along the approximately 4,000-foot-long edge has exceeded its useful life and shows sign of deterioration. Many wooden piles supporting wharf decks or floating docks are experiencing dry-rot, and the project proponents indicate that various existing wharf decks along the shoreline have been deemed unstable and too dangerous for public access. Shoreline protection at the site is comprised of various types of existing rip-rap slopes, timber, steel, and concrete seawall construction, and this system is likewise degraded and has failed at various locations along the shoreline.

Public access is provided pursuant to BCDC Permit No. 1988.025.01 along 355 feet of shoreline at the project site and is available to the public between 8:00 a.m. and 5:00 p.m. daily through an access gate at the intersection of Clement Avenue and Stanford Street. Shoreline public access extends approximately 9 to 20 feet inland of the bulkhead. The approximately 4,085 square feet of public access at the project site includes walkways along the shoreline adjacent to the marina gangway, amenities, and landscaping.

Proposed Project. The proposed project would redevelop the site to allow for a mix of uses including maritime, marina, commercial, retail, residential and open space. Specific project elements are as follows:

1. **Maritime and Commercial Development and Adaptive Reuse.** The project would provide approximately 180,972 square feet of maritime and commercial space, which would be clustered primarily within a “commercial core” along Schiller and Lafayette Streets. This space would be located within four proposed new commercial buildings as well as within 11 existing buildings at the site, which would be adaptively reused. Approximately 250 people would be employed at the project site at full build-out. The proposed project would include up to 60 dry boat storage spaces and public parking spaces, to replace a 250-stall dry boat storage space. A new boat hoist platform is proposed to be constructed over the Bay to support the transfer of stored boats to the water and back. A small amount of dredging is proposed as part of the project to support boat hoist operations.

2. **Residential Development.** The project would provide up to 760 residential units, including 104 affordable units. At full build-out, the project would house approximately 1,932 people. The project proponents are considering two types of residential buildings: (1) townhomes and (2) wrap buildings. The townhome buildings would be typically 2 to 3 stories tall, located adjacent to the Graving Dock Waterlife Park, the Harbor View Park, and the Wharf Promenade. Wrap buildings would be typically 4 to 5 stories tall, located adjacent to the Wharf Promenade and the maritime and commercial core.

3. **Public Access and Open Space Areas.** The project would provide public access along approximately 4,009 feet of the shoreline and public access areas totaling approximately 3.69 acres for the entire project site. The Bay Trail running through the maritime and commercial core has been excluded from the overall open space calculation. Public access improvements proposed include a new segment of Bay Trail, access at the existing wharfs, the new Harbor View Park, and access improvements at the graving dock.

   Public access improvements are proposed at the following areas:

   a. **Commercial Core Area.** This area is envisioned as a working waterfront, which while allowing public access along pedestrian corridors, may include limitations on access as necessary to ensure safety among the various users. The area would consist of a plaza and park area, in addition to the working dock. The area in front of Building 19 is the Maritime Yard, which provides outdoor land space for maritime and marina activities as needed. While designated firstly for maritime and marina use, the Maritime Yard is proposed to be publicly accessible allowing the public travel through the site to observe maritime marina activities occurring in the space.

   b. **Wharf Promenade.** The existing long wharf would provide bike parking spaces, benches and other seating, a multi-use recreational promenade, public art, marina artifacts, a "nautical landscape," pedestrian plazas, a history kiosk, and gathering areas for small groups, and would provide approximately 1.22 acres of public access.

   c. **Harbor View Park.** The new Harbor View Park would provide benches, picnic tables, barbeques, passive recreation space, large and small group gathering areas, a public lawn, and a multi-use plaza, and would provide approximately 1.22 acres of public access. A public parking lot would be located inland, adjacent to the park.

   d. **Graving Dock Waterlife Park.** The proposed park includes recreational facilities within the Bay in the area of the historic graving dock and an approximately 1.10 acres of public access upland area. In the Bay, two accessible floating docks totaling approximately 8,665-square-feet are proposed for pedestrian access to the water, launching of kayaks and stand-up-paddle boards, and other recreational uses. The upland area of the park includes a 16 foot-wide Bay Trail segment along the perimeter of the graving dock, short-term boat storage facilities, concession and rental facilities, a public restroom, benches and other seating, and planting areas. A planted slope or tiered edge transitions the approximately 2.9-foot grade change between the finish grade (El. +13.5 ft) [1] and the existing edge of the graving dock (El. +10.6 ft). A footbridge would span across the graving dock, creating a loop trail around the graving dock at the finish grade elevation.

4. **Marina.** Some "stub" nearshore pier structures and a boat yard "elevator" would be demolished. Floating headwalks would be installed. No additional slips would be added beyond the 529 existing, however certain slips and piers would be reconfigured, in some cases to allow for larger boats.

[1] All elevations in NAVD88

5. **Shoreline Protection.** The project would repair or replace seawalls, bulkheads, and revetments along approximately 4,009 feet of the shoreline. New seawalls and revetments would be placed on the outside face of existing walls. Approximately 14,610 square feet of rip rap revetment is proposed (approximately 9,860 square feet of which would be intended to stabilize and maintain existing rip rap revetments). New seawalls on the bayside of the existing deteriorated seawall are proposed along segments totaling approximately 1,300 feet of shoreline. Additionally, approximately 250 feet of exiting seawall is proposed to be repaired and reinforced.

Existing Approvals and Proposed Construction Timeline. On July 24, 2018, the City of Alameda approved the Alameda Marina Master Plan and a density bonus application for the project, and certified the Final Environmental Impact Report for the project. The project proponents, PSI and the City, have applied for a major permit to BCDC, which is currently pending. Construction is anticipated to occur between 2019 and 2024.

Phasing. The project may be constructed and occupied in phases. Each phase is proposed to include, at a minimum, the adjacent shoreline protection and stabilization. Marina improvements are proposed to occur throughout all phases. The anticipated phasing is as follows:

a. Phase IA (2020): Multifamily Residential High Density, and Waterfront Open Space, covering the approximate area between Alameda Marina Drive and Schiller Street.

b. Phase IB (2020): Maritime and Commercial Core, and Waterfront Open Space, covering the approximate area between Schiller Street and Lafayette Street.

c. Phase II (2022): Multifamily Residential Medium Density, Waterfront Open Space, and Open Space covering the approximate area between Chestnut Street and Willow Street.

d. Phase III (2024): Multifamily Residential High Density, Waterfront Open Space, and Open Space covering the approximate area between Lafayette Street and Chestnut Street.

Shoreline and land-side infrastructure improvements would occur in each phase, as necessary. The anticipated phasing may have sub-phases and may be adjusted due to economic conditions.

Operations and Maintenance. Thus far, the project proponents are still considering the parties responsible for ongoing operation and maintenance of the public access areas. The project proposes to establish a community facilities district and/or an owners' association that will collect funds in order to manage the open space that is for the benefit of all owners.

Engineering Criteria and Retrofit Strategies. SGH has performed a structural/shoreline condition assessment and seismic performance evaluation of approximately 4,000 feet of the existing shoreline. According to SGH, the seismic analysis and structural design check of the seawalls used the peak-ground acceleration (PGA) associated with the Maximum Considered Earthquake (MCE) to satisfy the life safety requirements as established in the California Building Code (CBC.)

According to SGH's executive summary of the structural improvements the entire waterfront would be improved by ground improvements and/or structural improvements to meet and exceed the requirements in the CBC. The structural improvements include:

- New Seawalls
- New Boat Hoist Structure
- Wharf Retrofit and Repair
- Graving Dock Improvements

1. **Seawalls.** The project features four seawalls and one graving dock denoted as Seawall 1, Seawall 4, Seawall 5, Seawall 6 and Graving dock. The walls vary in type, length and wall system. Their lengths range from 200 feet at Seawall 6 to 860 feet at the Graving Dock. The existing wall systems range from continuous steel sheet pile walls, precast concrete piles or timber piles with lagging. A majority of the seawalls including Seawall 4, Seawall 5, Seawall 6 and the Graving dock are anchored to reinforced concrete deadman anchors. SGH provides a full description of each wall system. The retrofit strategy will involve the installation of additional seawalls bayward of existing walls. A summary of the upgrades is found on Table 2-2 of the SGH's design criteria document. Seawall 1, Seawall 4 and Seawall 6 were built in the early 1960's and these are the locations that require replacement since the existing seawalls are deteriorated. Seawall 5 was built in the early 1980's and is in better condition. The design check indicates that Seawall 5 generally meet and exceed the life safety and seismic requirements in CBC. Hence Seawall 5 would not require replacement except for repair and upgrades to the walers and anchoring devices (tie-rods and deadman anchors).

   According to SGH's executive summary, the walls will be designed to California Building Code for New Design. The design implemented several major conservative measures in design beyond the safety requirements in California Building Code:

   - Designed for full MCE using life-safety criteria rather than collapse prevention.
   - Demand/Capacity Ratios (DCRs) conservatively limited to 0.8 even though permitted to use 1.0.
   - Although the existing seawalls currently carry all the static design loads in a safe manner, the new seawalls will be designed to carry entire static and seismic loads without accounting on the current seawalls.

   The engineering references used include the CBC 2016, American Institute of Steel Construction or AISC 360-10, Specification for Structural Steel Buildings, AISC 318-14, Building Code Requirements for Structural Concrete, NCHRP 611, Seismic Analysis and Design of Retaining Walls, Buried Structures, Slopes, and Embankment, and Caltrans Bridge Design Specification.

2. **Boat Hoist:** It will be new pile-supported wharf structure. It will use conventional design to current California Building Code and its demand/capacity ratios (DCRs) will be kept below 0.8 (allowed to use 1.0).

3. **Wharf Retrofit / Repair:** According to SGH, new piles and timber members will be added to existing structures.
    - 3-D SAP2000 models with PY soil springs at varying heights are used to evaluate global and local structural response of the wharves.
    - The retrofit scheme was evaluated using the design spectra at 5% damping with respect to the larger of the site-specific spectra developed by Rockridge and 80 percent of the mapped spectra per ASCE 7-10, Section 21.4.
    - It implemented several major conservative measures in design beyond the safety requirements in California Building Code:
        - The analysis used response modification factor of 1.0, although ASCE 7-10 Table 15.4-2 recommends R of 1.25 for self-support, non-building structures.
        - Knowledge factor of 0.75 to account for uncertainty in quality of materials and construction, although the CBC does not require a reduction of the knowledge factor.
    - Finally, the demand/capacity ratios (DCRs) of all structural components do not exceed 1.0.
4. **Graving Dock:** According the SGH, the tie-rods were uncovered and found to be in pristine condition. The repair will replace corroded anchors and damaged lagging. Historically, the dock channel was dewatered to construct and float out the precast concrete tube segments in the Webster tunnel that connects Oakland to Alameda. The channel has since been filled in and the load demands in the proposed use of the graving dock walls are considerably lower than its historical use. There was seismic design check for both liquefaction case and non-liquefaction case. The demand/capacity ratios (DCRs) were kept below 0.94 (allowed to use 1.0) in all the cases, and Factors of Safety for tie-rods and passive resistance of the deadman are shown to be much higher than the required values under all circumstances.

Wharves. According to SGH, the wharf structures are not essential to the regional economy, nor to any post-event recovery; therefore, the design classification of the wharf is low per CBC. The structures are classified as Risk Category II[2] per the CBC Table 1604.5; therefore, the seismic hazard is consistent with a 'Low' classification per ASCE 61-14. Similar to the seawalls, the intent of the seismic evaluation is life safety, and the structure was evaluated using the force-based method of the equivalent lateral force procedure.

The structures dates of construction vary from 1940 to 1960. They are wood framing members supported by creosote treated piles. In the 1990s, a survey of piles was performed to identify the extent of deterioration of the members at each wharf. Composite fabric wrap with grout fill and corrugated composite pipe with grout fill were used to repair deteriorated piles. Subsequently, another consultant, Sea Engineering Inc., investigated the overall condition of

[2] The basic underlying principle in assigning Risk Category is to recognize the impact of a structural failure. There are four Risk Categories (RC) under the building code, ranging from lowest hazard to human life (RC I) to highest hazard to human life (RC IV).

the piles of Building 14 wharf. Two of the three timber cores were observed to have light to moderate rot within 1 ½ to 5 inches of depth beyond the penetration of the creosote treatment. Petrographic analyses of the concrete cores extracted from the pile repair grout determined an average lower compressive strength due to porous and weak cement paste. In addition, chloride ion content was observed to have surpassed the threshold value for initiation of steel corrosion.

The retrofit scheme will include wrapping piles with significant section loss with FRP (Fiber Reinforced Protection) and grout jackets or driving new 16-inch square concrete piles, and strengthening timber joists and girders that require retrofit by sistering new structural members to primary members or by full replacement.

Building 13 Wharf was constructed between 1940-1960. The building is a single-story wood framed shear wall building used for commercial purposes. The structures will remain in place. Its retrofit would involve retrofitting 3 timber piles, installation of 2 new 36-inch diameter pipe piles for lateral restraint and installation of a row of new HP piles and walers next to the shoreline.

Promenade Wharf was constructed in the early 1940s primarily as a viewing platform. The promenade is 55 feet wide by 269 feet long and will be the project's largest overwater structure to serve as public access. The upgrades will involve strengthening of the girders at locations where spacing is greater than 10 feet and installation of new 16-inch square concrete piles offset from the original pile location and new HP piles will be installed along the land-side edge of the wharf. A DSM (Deep Soil Mixing) buttress will be installed along the landside of the promenade to prevent impacts from shoreline slope deformations such as liquefaction-induced lateral spreading. However, SGH's results of the gravity and seismic analysis show that the retrofit scheme provides adequate strength for the life-safety requirements of the CBC.

Building 5 Wharf was also constructed in the early 1940s. The wharf supports Building 5, a two-story wood framed shear wall building that served as an office and light storage facility. The building has a balcony, which will be demolished in order to replace a damaged girder under the deck that supports both the balcony and the deck. In addition, one pile will be replaced with a concrete pile and new HP piles will be installed along the land-side edge of the wharf.

Building 5 Edge of Wharf is located adjacent to the Building 5 Wharf and was constructed between 1940 and 1960. The wharf is separated from the Building 5 Wharf and Promenade Wharf with a joint, responding independently to seismic inertial forces. The retrofit plan will include strengthening girders, replacement of one pile with a concrete pile and new HP piles will be installed along the land-side edge of the wharf.

Building 14 Wharf was constructed between 1940 and 1960. The project proposes to demolish the building leaving the wharf. Six piles and five girders will be retrofitted. The proposed retrofit plan includes the strengthening of girders, installing four new HP piles at the landside and installing a new 36-inch diameter pipe pile adjacent to one north east corners.

The current wharf decks range from approximately elevation 11.5 to 12.0 feet. As part of the adaptive measures against the future SLR, a 2-foot timber deck frame would be added in the future on top of the existing deck to meet the elevation of the onshore Bay Trail and backland. SGH indicates its preliminary design check shows that the existing wharf piles have adequate capacity to carry the weight of the additional timber deck frame.

The reference codes for the design assessment of the structures over water include the CBC 2016, ASCE 7-10, Minimum Design Loads for Buildings and Other Structures, ASCE 61-14, Seismic Design of Pile-Supported Piers and Wharves, ACI (American Concrete Institute) 318-14, Building Code Requirements for Structural Concrete and Commentary, AISC 360-15, Specifications for Structural Steel Buildings, and AWC (American Wood Council) NDS-2018, National Design Specifications for Wood Construction Including Supplements.

Seismic Instrumentation. Five wharves were assessed with recommendations for seismic instrumentation at the site: Building 14 Wharf, Building 13 Wharf, Promenade Wharf, Building 5 Wharf and Building 5 Edge Wharf.

Geotechnical Investigations. According to the Rockridge Geotechnical executive summary, the geotechnical considerations for shoreline slopes and seawalls at the site are the following:

Site located along a favorable stretch of Alameda Shoreline

- Existing shoreline closely matches pre-development shoreline (no extensive fills into water)
- Weak bay and estuary deposits typically 5 feet thick or less in most of site
- Strong layer Merritt Sand present across almost entire site
- No seismically induced ground failures documented in vicinity during 1906 and 1989 earthquakes
- Extensive research of historic land-use and geologic features performed to characterize likely subsurface conditions
- Anticipated subsurface conditions confirmed via extensive subsurface investigation, using a variety of exploration technologies

Site-Specific Seismic Evaluation

- Performed site-specific evaluation at wharf structure per ASCE 7-10 (2016 CBC) requirements
- Recommended MCER acceleration spectrum exceeds code-based (mapped) values by 15%, 40%, and 55% at periods of 0.5, 1.0, and 2.0 seconds, respectively.

Liquefaction Evaluation

- Due to limited amount of reclaimed land, typically low to moderate amounts of liquefaction
- No liquefaction-induced lateral spreading hazard at slopes
- Larger amounts of liquefaction confined to previously excavated/backfilled zones of known and limited extent (primarily at existing graving dock) – accounted for using increased lateral earth pressures

Lateral Earth Pressures

- Evaluated lateral earth pressures for static, seismic, and (where appropriate) liquefied conditions
- Seismic earth pressures evaluated using two methodologies, and recommended the higher value be used for design:

Generalized Limit Equilibrium (GLE), per NCHRP 611 (2008)
Sitar et al. (2012)

- Considered differential water condition (MHW – MLW) to develop additional water pressure for seawall design
- Evaluated global stability using drained strengths (static) and undrained (seismic) strengths

Slope Stability at Wharf and West Slope

- Evaluated global stability using drained strengths (static) and undrained (seismic) strengths
- Where factor of safety was found to be marginal, proposed strengthening soil behind slope face through deep soil mixing (DSM)
- Measures proposed to reduce effects of minor seismically induced slope deformation at west slope during MCE-level earthquake (no existing or proposed structures nearby)

Deep Soil Mixing (DSM) Proposal. DSM will be installed at onshore side of the slopes adjacent to Building 5 Wharf and at the Wharf Promenade. DSM, a concrete retaining wall over the DSM, and new fill reinforced with geogrid will be installed at onshore of the West Slope beneath Bay Trail. Geogrid reinforced fill will be placed beneath the Bay Trail at onshore side of Slope 3. The DSM systems will be installed under design-build contracts by specialty contractors with proprietary technologies. According to Rockridge, the DSM should be designed and constructed in accordance with the guidelines of the Federal Highway Administration Design Manual: Deep Mixing for Embankments and Foundation Support, Publication No. FHWA-HRT-13-046, dated October 2013 (FHWA, 2013.) The installation of the DSM system should also include a field and laboratory quality control program in accordance with FHWA, 2013.

Sea Level Rise. According to CBG, the project utilizes the Sea Level Rise (SLR) projections of the March 2018 California Ocean Protection Council (OPC) and is designed to have resiliency including built-in protection from SLR and planned adaptive capacity strategies. The Council's updated report estimates the likely range of SLR at year 2100 for medium-high risk aversion to be 5.7-6.9 feet and extreme risk aversion to be 10.2 feet.

BCDC requires shoreline projects to be properly engineered and provide flood protection for the expected life of the project based on a 100-year flood event (FEMA Base Flood Elevation) that takes future SLR rise into account. Base Flood Elevation at the site is designated as El. 9.8 ft NAVD88. A proposed Bay Trail public access will be part of the project along the shoreline. The minimum design elevation of the proposed public access, streets and building sites will be at a minimum of El. 13.5 feet, which would provide built-in protection from over 7 feet SLR above the current mean higher high water and 3.7 feet of future SLR above the 100-year FEMA BFE,

which is the estimated SLR projected to occur soon after 2070 for a medium-high risk aversion site with the high emission standards based on the California OPC SLR projections for San Francisco.

While the project would be designed to tolerate periodic flooding, occasional inundation of portions of the project site is anticipated as sea levels rise. Based on SLR projections for medium-to-high risk aversion scenarios from the OPC for this site, all proposed shoreline areas at the site would be resilient to a 100-year flood event in the year 2050 (SLR projection of 1.9 feet), except for the existing Buildings 25, and 26, which would begin to be inundated before then, but would not publicly accessible. The Promenade Wharf included in the public access area (El. 12 ft) would be inundated during a 100-year flood event by the year 2060 (SLR projection of 2.6 feet).

The proposed shoreline improvements, including wharves, seawalls, and revetments, are planned with adaptive capacity to accommodate being raised in the future in the case that sea level rise exceeds projections. Shoreline design would accommodate future adaptive measures for potential future SLR in excess of 3.5 feet. The proposed new buildings would be raised to establish the minimum habitable floor elevation at El. 14 ft.

The entire site would be inundated under the circumstances of a 100-year flood event in the year 2100 (SLR projection of 6.9 feet High Emissions Scenario) for the proposed initial project design. Adequate land and right of way are proposed to be preserved along the shoreline to accommodate further elevated shorelines and/or floodwalls in the future should it be necessary to further manage and adapt to sea level rise. The adaptive strategies would include implementation of floodwalls, earthen berms, elevated wharves and other storm drain system enhancements. Portions of these adaptive measures include repurposing areas currently proposed to be public access areas for berms or other flood protection.

Some of the wharves including the Promenade and Building 5 wharves will be retrofitted and adapted to new flood conditions to extend their useful lives approximately 40-50 years while others will be removed once their deck elevations are exceeded by rising seas.

The project proposes to establish a community facilities district and / or owners' association that will be responsible for monitoring sea level rise. This would include monitoring scientific guidance and updates on sea level rise, as well as commissioning periodic shoreline condition assessments by a coastal engineer to document the physical effects of sea level rise and life expectancy of the shoreline protection measures. The district or association would also be responsible for collecting and managing reserve funds from the properties to implement the adaptive measures in the future when they are determined to be necessary.

Commission Findings and Policies

Bay Plan Policies. The project raises issues related to Bay Plan policies on topics including Safety of Fills, Shoreline Protection, Public Access and Climate Change. The following policies are relevant for the Board's review:

Safety of Fills. The policies on the Safety of Fills seek to reduce risk of life and damage to property for projects that require construction on fill in San Francisco Bay. The following policies apply:

1. **Policy No. 1**. The Commission has appointed and empowered the ECRB to "establish and revise safety criteria for Bay fills and structures thereon."
2. **Policy No. 2**. Even if fill may be permissible, no fill or building should be constructed if hazards cannot be overcome adequately for the intended use in accordance with the criteria prescribed by the ECRB.
3. **Policy No. 3** requires the installation of strong-motion seismographs on all future major landfills with the guidance of and recommendations by the California Geological Survey, for purposes of data comparison and evaluation.
4. **Policy No. 4** requires that adequate measures be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of the project. New projects should either be:
    a. set back from the edge of the shoreline so that the project will not be subject to dynamic wave energy;
    b. built so the bottom floor level of structures will be above a 100-year flood elevation that takes future sea level rise into account for the expected life of the project;
    c. specifically designed to tolerate periodic flooding; or
    d. employ other effective means of addressing the impacts of future sea level rise and storm activity.

    Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.

Shoreline Protection. The policies seek to address the protection of the shoreline and public access along the shoreline from erosion and damage from flooding.

1. New shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if: (a) the project is necessary to provide flood or erosion protection for (i) existing development, use or infrastructure, or (ii) proposed development, use or infrastructure that is consistent with other Bay Plan policies; (b) the type of the protective structure is appropriate for the project site, the uses to be protected, and the erosion and flooding conditions at the site; (c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account; (d) the project is properly designed and constructed to prevent significant impediments to physical and visual public access; and (e) the protection is integrated with current or planned adjacent shoreline protection measures. Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design.

2. Riprap revetments, the most common shoreline protective structure, should be constructed of properly sized and placed material that meet sound engineering criteria for durability, density, and porosity. Armor materials used in the revetment should be placed according to accepted engineering practice, and be free of extraneous material, such as debris and reinforcing steel. Generally, only engineered quarrystone or concrete pieces that have either been specially cast, are free of extraneous materials from demolition debris, and are carefully selected for size, density, and durability will meet these requirements. Riprap revetments constructed out of other debris materials should not be authorized.
3. Authorized protective projects should be regularly maintained according to a long-term maintenance program to assure that the shoreline will be protected from tidal erosion and flooding and that the effects of the shoreline protection project on natural resources during the life of the project will be the minimum necessary.
4. Whenever feasible and appropriate, shoreline protection projects should include provisions for nonstructural methods such as marsh vegetation and integrate shoreline protection and Bay ecosystem enhancement, using adaptive management. Along shorelines that support marsh vegetation, or where marsh establishment has a reasonable chance of success, the Commission should require that the design of authorized protection projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever feasible.
5. Adverse impacts to natural resources and public access from new shoreline protection should be avoided. Where significant impacts cannot be avoided, mitigation or alternative public access should be provided.

Public Access. Public access is generally required as an integral component of shoreline development and usually consists of pedestrian and other nonmotorized access to and along the shoreline of San Francisco Bay.

Public Access Policy No. 5 requires that public access be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding.

Board Questions

BCDC request the review of this project by the ECRB due to the magnitude and engineering complexity of the shoreline work and the impacts to the public access related to the project. The project proposes to retrofit 1,260 linear feet of seawalls that have deteriorated or do not meet the present day building code, built a boat hoist structure, repair a historic public access wharf promenade and install a new public access Bay trail along the entire shoreline. The retrofit scheme seeks to provide adequate strength for life-safety requirements pursuant to the California Building Code.

Therefore, BCDC would like the Board to help the staff assess the following:

1. Because of future rising sea levels, staff have concerns regarding ground water rise onshore of the ground improvements and any physical hazards arising from it. Further, the staff wants your opinion on whether the strategies to secure the shoreline are adequate, meet life-safety criteria and last for the life of the project.

2. The staff would like your assessment on the SLR adaptation measures being proposed on whether the seawalls would be able to support the additional fill (berm/levees) required to raise the shoreline.
3. The historic wharves decks will be elevated above future SLR by additional installation of the pile caps. Are there any potential physical risks that could render these structurally obsolete and/or result in issues of life-safety?
4. Are the DSM criteria adequate for the project?
5. Graving Dock – Is it your assessment that two tie rod investigations are representative of the overall condition of the structure? Are the proposed repairs sufficient to ensure its future durability?
6. Are there any uncertainties about the life safety aspect of the overall repair strategies?

Reference Materials for July 25, 2019 ECRB Review Meeting[3]

1. SGH, Demolition of Shoreline Infrastructures Memorandum, June 5, 2019 from Sam Yao to Sean Murphy.
2. CBG, Memorandum to Sean Murphy from Angelo J. Obertello, P. E., Sea Level Risk Assessment and Strategy, Alameda Marina, Alameda California, June 3, 2019.
3. SGH, Design Criteria for Structural Evaluation and Design of Seawalls and Graving Dock at Alameda Marina, May 31, 2019.
4. SGH, Condition Assessment and Design Criteria for the Structural Evaluation of Wharves at Alameda Marina, May 31, 2019.
5. Rockridge Geotechnical, Alameda Marina Shoreline Improvements Geotechnical Design Criteria Report, Alameda, California, June 7, 2019.
6. Rockridge Geotechnical, Appendix A Cone Penetration Test Results, June 7, 2019.
7. Rockridge Geotechnical, Appendix D MASW Seismic Survey Results, March 25, 2019.
8. Alameda Marina Project Phasing Plan, June 2019.
9. California Ocean Protection Council Table 1: Projected Sea-Level Rise (in feet) for San Francisco, March 2018 update.
10. Plan Set: "Alameda Marina Development Project/Alameda, California," dated May 31, 2019 by Simpson Gumpertz & Heger.
11. Stellar Environmental Solutions, Inc., Summary of Work Performed, Alameda Marina Development, Alameda, California, June 3, 2019.

[3] All reference materials can be made available upon request. Please contact Rafael Montes, Staff Engineer (415/352-3670; rafael.montes@bcdc.ca.gov).